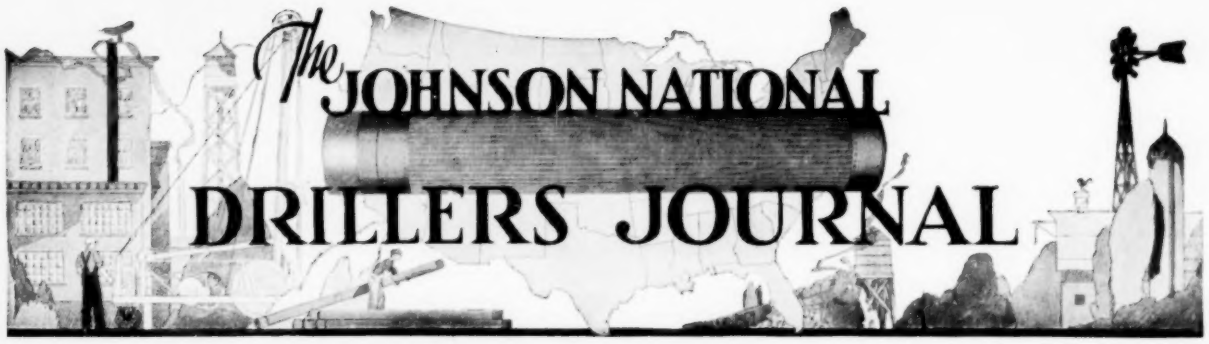

Vol. 25, No. 1 THE JOHNSON NATIONAL DRILLERS' JOURNAL Jan.-Feb., 1953

REASONS WHY SOME WELLS ARE DISAPPOINTMENTS

Introduction and Importance of Testing

Many water wells prove to be disappointments. Some of them do not come up to expectations at the time they are tested on completion. Others fall off in capacity or fail from other causes after a few years' use. Many of these failures could have been prevented entirely if a few fundamental facts had been known and considered when the well was constructed.

With the idea that a discussion of typical well failures will be helpful, we are going to discuss the subject with considerable detail and frankness hoping, of course, that out of the discussion our readers, whether they be well owners, well drillers, or others interested in well construction, will be able to distinguish between a good well and a bad well and what may be the trouble if they have a well disappointment on their hands.

The first thing that comes to mind is the woeful lack of basic information on the occurrence and flow of ground water, coupled with a lack of knowledge of scientific well design. Even the matter of operating a water well efficiently is neglected and considered of no importance, though this one phase of well work contributes more to the life of a well than any other one thing that we know of.

It is not expected that everyone interested in well construction should be an expert in all phases of well construction. However, the problems of well construction are not beyond ordinary intelligence and good business judgment. As a whole, the reasons for well failures fall into two classes or categories, namely, failures due to formation conditions, and, failures due to the type of well and construction methods used.

With a new administration coming into office everyone is wondering what changes there will be in our political and economical situation. There will be changes, but they will be gradual. Nothing will take place overnight.

Here at Johnson's our policy will remain the same as it has always been. We will continue to put forth our best efforts to serve our customers promptly with the screens they want.

Material is coming through better and there is no let-down in well drilling. We look forward to hearing from you in 1953.

The principles of ground water flow are not difficult to understand, if we concede that all ground water first comes from precipitation, and, secondly, that it is moving slowly through the ground formations to some lower elevation and finally to the sea, and, thirdly, that the rate of movement is controlled by the texture of the formations and is indicated by the slope of the water table. The yielding ability of a formation is, therefore, a function of the size and shape of the particles making up a water-bearing bed and the pressure causing water to flow through the formation. This is simple enough, but many people designing and building wells do not know what these relationships are, nor do they consider them when a well does not come up to expectations as far as yield is concerned.

Before any important well or project involving the construction of several wells is started, everyone concerned should realize the value and necessity of informing themselves of the yielding possibilities of the formations available. Many such projects are failures from the start as too much is expected of each well before it is constructed. No well can yield more than a formation will produce no matter how well it is designed and constructed.

To secure the necessary information, it is often necessary to make a preliminate study of the entire area, then follow up with field investigations. These usually take the form of test holes of some kind. Perhaps geophysical testing is done first to locate the best formations. This is all right as far as it goes, but before wells can be located and designed, actual samples of the formations, water, and accurate logs should be secured.

This is not so easy, as it requires test holes to be put down. Natural-

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REASONS WHY SOME WELLS ARE DISAPPOINTMENTS

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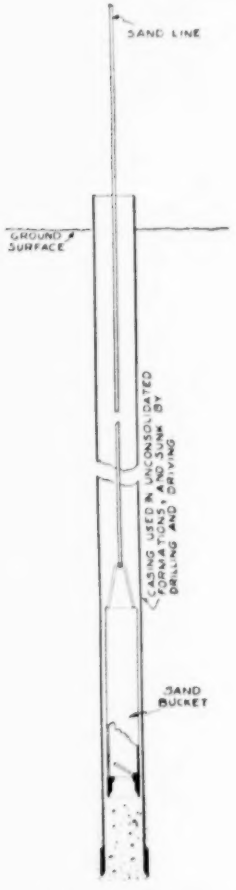
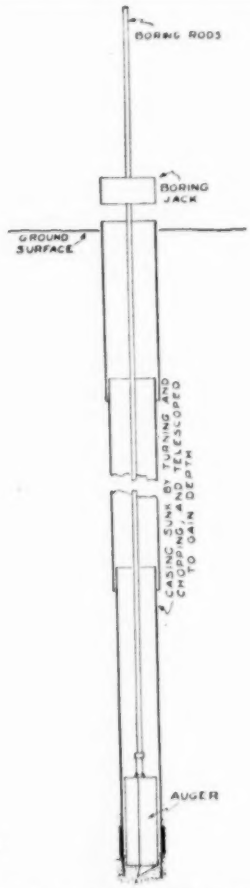


Sand Bucket Method Drilling.

ly, if the job is important, the test work is important. There are several ways of putting down test holes. Here is the first place where many disappointments originate, due to the wrong method of testing being used. In other words, the test holes do not serve their purpose. It is accurate information we are after and if methods are used that do not give us accurate information, then the whole thing is a waste of time and money. There should be no guesswork in testing. Anyone having the job of analyzing and interpreting drillers' samples can soon tell how careful the driller was in putting down his hole and taking a formation sample.

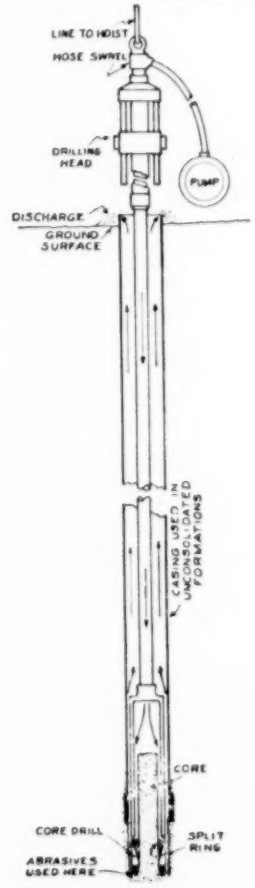
Not long ago a case of this kind came to our attention. A town council engaged a driller to put down a test hole in the bottom of an abandoned well. They did not specify the method of drilling to use or take any steps to insure that accurate formation samples would be taken. The driller put a hole down to bedrock but the method of drilling he used was not the best for obtaining samples. A log was written up and such samples as were taken were sent in for an-



Auger Bucket Method Drilling.

alysis. Assuming the log and the samples were accurate, engineers were employed to supervise the construction of a new well and pumping station. The well contract was let to a more experienced driller who insisted on putting down another test hole. This also went to rock, but the method used was entirely different. Where the first driller reported sand and gravel, the second driller found nothing but hardpan with a little sand and gravel in it, and no yielding ability whatever. This development threw everyone into a tail spin. After much argument and finger pointing, it was decided somebody did not know what they were doing. Fortunately, there was a higher water-bearing fine sand formation from which sufficient water could be developed to warrant the completion of the project.

The moral of this story is that the whole incident could have been prevented and the town council relieved of worry if sufficient importance had been placed on the drilling of the test hole in the first place. This experience has been repeated many times. The fault is not entirely the driller's as he is often limited to putting down the cheapest hole that can be put down. The trouble lies in the fact that



Core Drill Method Drilling.

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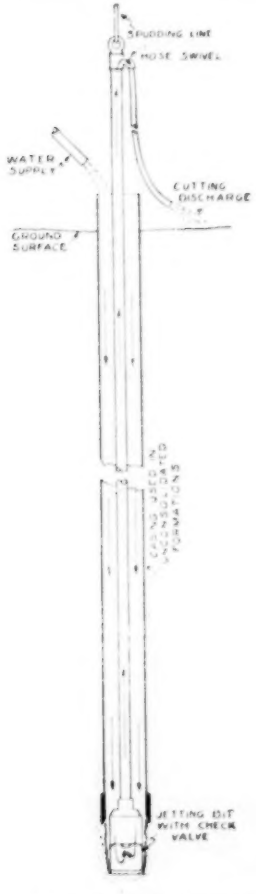
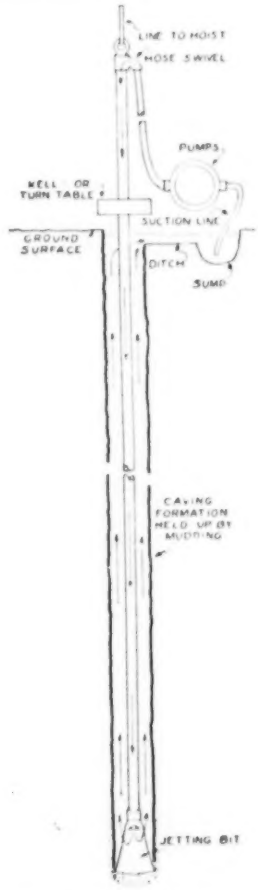
neither the town council nor the driller appreciated the necessity for accurate testing in the first place.

It should be understood that there is more to putting down a test hole than taking a formation sample. An accurate log of each formation penetrated must be secured at the same time. This log should show the depth to each formation and its thickness. The written log should accurately describe each formation. Such designations as sand and gravel mean nothing unless the size of the particles are indicated. When samples are to be turned over to someone for analysis, it is not necessary to do this. They know from the analysis whether the sands are fine, medium, or coarse and whether there is any gravel in it or not. Written logs are often inaccurate and misleading if prepared by a driller as very few go to the trouble of analyzing formation samples. There is an old saying that a well log once written becomes a reality. This has been the undoing of many a well job as the written log was found to be wrong when actual samples were taken by using proper methods.

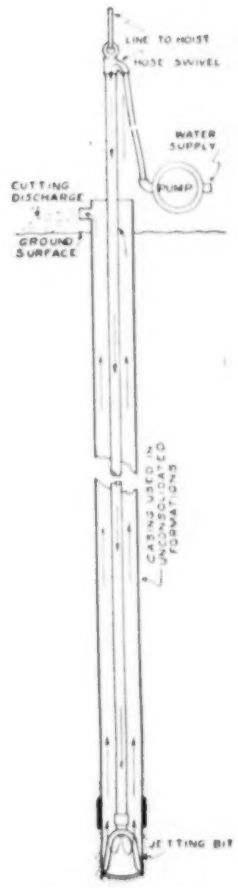
Another phase of test work that leads to disappointments later is that not enough holes are put down to get a picture of the whole formation. Consequently, great hopes are built up on one test hole, but there may be a clay bank nearby that would have changed the whole picture had that fact been known. In many cases additional test holes would have shown better locations available a short distance away. The construction of an important well should never be based on the results of one test if the best results are desired. Two holes are the minimum, three are better, and four are better yet.



Hollow Rod Method Drilling.



Rotary Method Drilling.



Jetting Method Drilling.

Of equal importance with accurate samples are measurements to the water table. These should be taken when the water table is first struck and then carefully checked all during the drilling until the hole is completed. Data from holes without measurements to the water table is practically of no value in designing a well. Many times this information has to be supplied by the driller after he has left the job. It is easy to get if the test hole is put down properly. The lack of such information may influence the final outcome of a well. It should always be noted on samples, logs, or drawings of test holes.

We do not want to seem overly particular about testing but the more disappointments we see, the more we realize that many of them

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REASONS WHY SOME WELLS ARE DISAPPOINTMENTS

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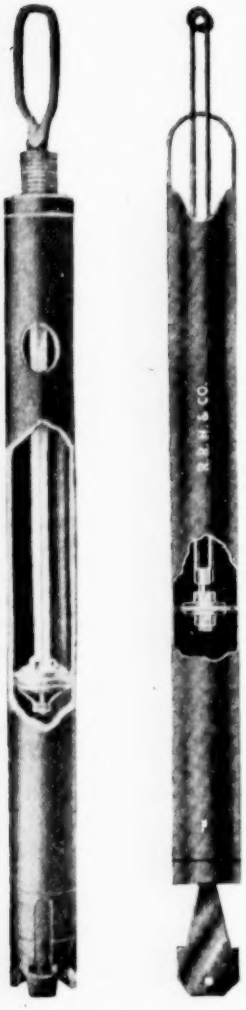

Suction Type Sand Buckets.

could have been avoided if the test work had been done more carefully. Just as much care should be used in taking, marking, and examining samples as any other phase of the work. It is no easy job to secure representative formation samples, even though many drillers and well owners think it is. Most samples lose some of the "fines" during the drilling of the hole. This is the material which determines the yield of the formation, not the coarse particles. Occasionally, we see samples from which the "fines" have been washed out. This immediately destroys the value of the sample, just the same as a sample full of "drilling mud" is of no value.

The basic idea of all important testing is to get samples that represent the natural formation as nearly as possible, water levels that indicate the true water level of each water-bearing formation penetrated, an accurate log of the hole and samples of the water from each formation. If these things are not done while testing, there can be no cause for complaint or disappointment afterwards due to a lack of information. People contracting for wells should insist on the best possible test holes being put down before a well is started. Drillers should be willing to co-operate and have equipment available for such work. It will be money well spent in the long run and prevent many unsatisfactory wells being constructed.

It is surprising how many drillers take only one sample from a formation to determine the screen they should use. This is risky business, especially if the formation changes immediately above the top of the screen. Many wells that leak fine sand continuously could have been built to prevent this if the driller had sent in a sample of the formation immediately above the top of the screen. These are little things but they are important as far as the performance of the screen and satisfaction from the well are concerned. There are very few sand formations, unless they are loose sandstone, that do not vary in grading every few feet. It is always better to have more samples than not enough. Likewise it is always better to carefully examine a sand sample than to rub between the fingers or look at it in a pile. Simple precautions like this have saved many a driller and well owner trouble. Actually there are so many things that can happen when putting down test holes that everyone can well afford to take every precaution they know of. If a well is no better than the formation in which it is built, and a well is no better than the screen used in it, a well screen is no better than the formation samples sent in to select the size of slot openings.

Good drillers know these things and are constantly improving their methods of putting down test holes. Unfortunately, there are drillers who are more interested in drilling at so much a foot than they are in the niceties of testing. They and their customers are the ones who are disappointed later on. We believe that in time all drillers and well owners will appreciate the importance of good and sufficient testing. Many of our larger drillers know this now and make it a regular practice to carefully examine all samples from test holes before they will recommend or give prices on the well work covered by the test program.

In order that everyone concerned may know how test holes are put down, we are going to describe briefly the six methods in general use and comment on each one. By doing this we do not mean to say that any one method should be used exclusively. The method used depends on the ground formations and the necessity for accurate testing. What we would like to point out is that some methods are better than others for the purpose of securing accurate formation data and samples.

The six different methods of putting down test holes can be divided into two groups or classes. Three of them might be called "hydraulic" methods and three of them "drilling" methods. By hydraulic methods we mean holes put down by jetting, rotary drilling, or hollow rod drilling. Each of these methods uses water under pressure to loosen and remove the drillings.

In (1) jetting down a hole, a pump at the surface forces water down through a drill pipe which has a special jetting bit on the lower end. This drill pipe is turned by means of a swivel head during drill-

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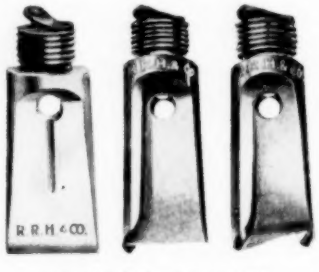

Standard Jetting Drills.

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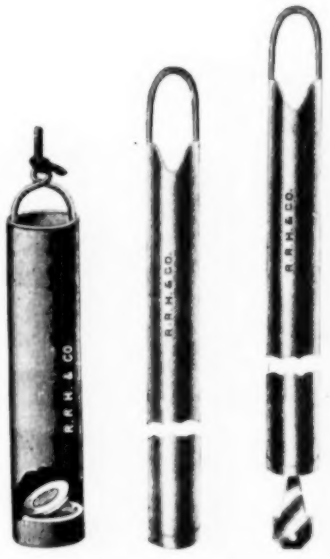
ing operations. As the bit and drill pipe are lowered, casing is placed in the drill hole to support the side walls. The loosened formation material is brought to the surface by the water forced out of the lower end of the drill pipe. Samples are taken from the material discharged at the surface. Naturally these samples are broken up by the bit during the loosening process and the individual particles separated still more when being carried to the surface. Such samples do not represent the actual formation conditions, though they will indicate in a general way whether the clays are hard or soft and whether the sands penetrated are fine or coarse. Accurate logs are hard to get with this method of drilling. Measurements to the water table must be made after the water level has receded. Such measurements are oftentimes hard to get and then not too reliable. The casing is withdrawn after it has served its purpose.

Holes put down by (2) rotary methods also depend on water forced down through the drill stem to loosen and remove formation samples. The difference between (1) and (2) is that "mud" is used in the drilling water to form a mud wall hole. In other words, no casing is used in a rotary hole as the drilling mud serves to build up a mud wall stiff enough to prevent the drill hole from collapsing. This is a fast way of putting down a test hole, but probably the poorest way of all as far as obtaining representative samples is concerned. However, this is a good method to use when it is desired to find out what the ground water conditions are over a large unknown area. By using this method of drilling more holes can be put down quickly and at less cost. The information secured will be sufficient to determine where the best formations are located and whether or not more accurate methods of testing are warranted. Rotary methods are largely used in preliminary surveys, though some test holes are put down by these methods and samples are taken for analysis. Only an expert can judge such samples and determine the portion of fine sand and clay that is formation material and the portion that is drilling mud. Even then the log is likely to be from 2 to 20 feet off as far as changes in the formation are concerned. This method should not be used to obtain formation samples for analysis unless some sort of core sampler is used ahead of the drilling bit.

Standard Hydraulic Drills.

"Drilling methods" as a whole are much better than "hydraulic methods" when it is essential to secure the best possible logs and samples. The most commonly used by drillers is the (4) standard or sand bucket method. Under this method the hole is drilled and cased using standard tools and drilling methods. Samples are taken from the bottom of the drill hole by an ordinary sand or suction bucket. The tools have either a valve in the bottom or a piston which draws the loosened formation material in the bucket. The drill hole is cased from the beginning and is kept at the bottom of the hole at all times, either by its own weight or by driving. Practically all drillers are familiar with sinking a test hole by this method. Some prefer piston or suction buckets over the ordinary sand bucket or bailer. Whatever the tool used the driller can obtain a much better formation sample and log by this method than by any other in common use. Care must be used, of course, especially as to where and when the samples are taken. If this is done and the samples placed in tight containers at the surface, then properly selected by splitting, fairly accurate samples can be obtained. The thing to remember is that it is the "fines" which count in selecting screen openings and estimating yielding ability of a formation. Changes in the water and formation levels can be determined accurately by this method and the casing salvaged after the test hole is completed. This method of testing is acceptable to engineers, water



Valve Type Sand Buckets.

officials and screen manufacturers. It is probably the most reliable method being used today in the well drilling industry. Recently some of our more progressive drillers have added "core samplers" to their equipment in order to obtain better formation samples. This takes more time, but the results are considered worth it. A core sampler is a fairly inexpensive tool easily obtained from the manufacturers of such tools. A little patience and practice with it gives both driller and customer added confidence in the result secured from a test hole.

Very few drillers use (5) boring methods to put down test holes. The use of auger buckets and boring rods requires time and equipment to rotate the auger buckets. This method of taking samples is probably more accurate than the sand bucket method. In reality it is even better than a core sampler when it is of importance to secure the best possible samples. This is done by rotating an auger bucket below the bottom of the drill hole until it is full of formation material. The auger bucket is then brought to the surface by uncoupling the boring rods. The bucket is emptied by unlatching a hinged door in the side of the bucket. The use of auger buckets insures a true sample from the bottom of the

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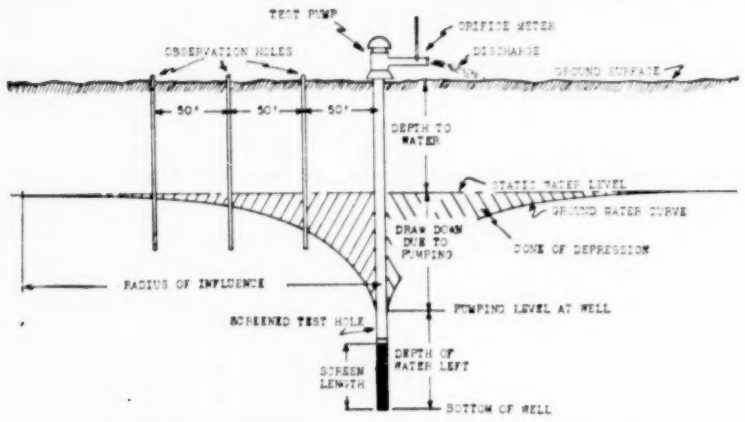

Installation for Determining Yield of Test Hole by Pumping.

REASONS WHY SOME WELLS ARE DISAPPOINTMENTS

(Continued from Page 5)

drill hole. All of the fine material is retained in the bucket as it is brought to the surface. If it were not for the fact that this method is slow and costly, it probably would be more generally used in testing.

Coring methods (6) are used to obtain actual core samples of hard formations. This method is widely used in prospecting for mineral deposits, checking building and dam foundations, or testing for highway foundations. This method can be used in any kind of formation including solid rock, and is used more often in the oil well field than for water wells. It is well to know about it, however, as it is without question the only method of obtaining a true formation sample. Special core barrels which will retain the formation samples intact are required, also drillers who are experienced in operating core drilling equipment. To obtain a core sample, a casing is sunk to the hard formation from which it is desired to obtain a sample. Core drilling is then done with two types of bits, one known as a diamond drill, the other as a calyx drill. Diamond drilling requires the use of diamonds or borts. On account of the cost of diamonds, other ways of obtaining core samples have come into general use, such as the calyx drill. The hoisting and driving equipment is the same, the only difference being in the core barrel. The calyx drill bit is made of hardened steel. Above the core barrel a tube open at the top called a calyx is placed outside of the drill rods. The coarser drilling particles are caught in this tube or calyx as they drop out of the drilling water. They are removed when the rods and core barrel are removed furnishing a duplicate sample of the formations penetrated. The calyx drill is used for larger holes than the diamond drill. In soft or moderately hard materials it is the cheapest way to obtain core samples.

The thing that must be remembered in all test hole drilling is the purpose of it, namely, to secure information regarding the water-bearing formations, not just a sample of the sand and gravels. The movements and location of the water level are just as important as the formation samples, but no well can be properly designed to fit a given formation condition without knowing where the water level is; nor should the construction of an important well be made on the results obtained from one test hole. Larger developments often require a complete testing program before the actual construction of any wells is undertaken.

Many drillers and owners often insist on pumping test wells. This is all right as far as the test hole is concerned. The pumping test will show how much water the test hole will yield, but nothing more. Without additional tests no one can tell what effect the pumping of a test hole has on the water-bearing bed, nor can anyone accurately predict the yield of a well of larger diameter in the same location.

If a test well is to be pumped, several observation holes should be put down into the water-bearing formation. These holes should be about the same distance apart, but one of them fairly close to the test well. There should be enough observation holes put down to extend beyond the influence of the pumping. The purpose is to obtain readings to the water table which will show the effect of the pumping on the water-bearing bed. After the pumping level becomes stabilized at a given rate of pumping, readings are taken in each observation hole. This data can be used to calculate the yield of the bed as a whole and will also indicate maximum yield to a well of larger diameter and of proper design. In other words, tests of this kind use the test wells and observation holes to determine the yielding ability of the formation rather than the yield of the test well alone. To make the field installations and readings is the job of the well driller. To make the calculations, the services of an engineer familiar with the latest scientific formulas are required. Many of our larger cities and industries are requiring such readings in their contracts for testing. They know that the day of "hit or miss" testing is past and they do not want to leave any stone unturned to prevent disappointments in their well installations.

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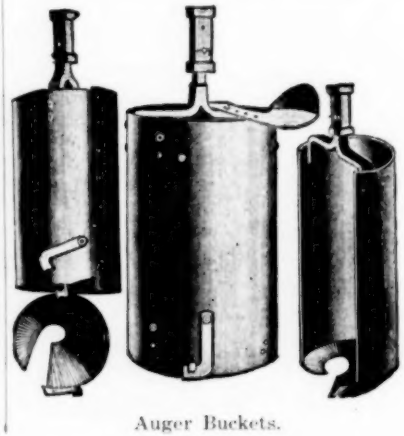


Auger Buckets.

REASONS WHY SOME WELLS ARE DISAPPOINTMENTS

(Continued from Page 6)

To sum up the question of test hole drilling, we would say that this is the most important phase of a g r o u n d w a t e r development, whether it involves the construction of one well or a dozen. In simple terms, test holes are for the purpose of locating an adequate supply of ground water which can be developed by the construction of a good well and can be pumped at a rate that will lead to the longest possible life. To neglect this phase of well construction is often costly to the well owner and a reflection on the driller's ability to do first class work.

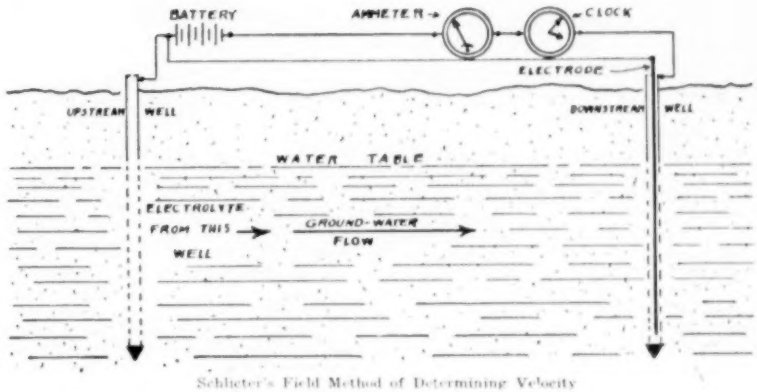
——o——

A henpecked looking little man was escorting his wife to a concert. They arrived late. "What are they playing?" he whispered to his neighbor.

"The Fifth Symphony."

"Well, thank goodness, I've missed four of them, anyway."

This is a 12-inch hole started as a test hole for oil and abandoned in 1910. Hagenah Well Drilling of Cole Camp, Missouri fished out the old 12-inch tools and completed the hole with the rig shown in the picture.



Schlicter's Field Method of Determining Velocity

MANHATTAN BEACH EXPERIMENT

Due to the gradual movement of sea water into the fresh water zones lying along the coast of California, steps were taken almost two years ago to correct the situation. The first project of any size involved a program of well building, the purpose of which should be of interest to drillers and engineers everywhere.

It is a well known fact that salt water will move inward along a sea coast whenever the slope of the fresh water table is flat or reversed. This has been observed along the Atlantic Coast in Florida and the Pacific Coast in California. Many remedies have been suggested to halt or minimize the effect of salt water m o v i n g inward, but none of them have proven 100% successful as yet. This is the reason that the project in California is known as the Manhattan Beach Experimental Project. It is based on the concept that a series of wells built s h o u l d be along the beach and then used as recharge wells to build up a water ridge or barrier by raising the ground water level above the sea level.

Before this project was undertaken, many fresh water areas along the California coast had either been ruined by salt water intrusion or were in danger of being ruined.

The first appropriations for studies were made after $75,000.00 was appropriated for this purpose in 1951. The State Water Resources Division prepared its report and made several recommendations to relieve the situation. Most of them recommended recharging the lowered fresh water reservoirs, either by percolation from the surface, reducing pumping rates or building up artificial underground barriers by some means.

Recharging g r o u n d water is common practice in California having been first started by flooding the surface and letting percolation do the rest. Later recharge wells came into common use. So there was considerably more data and experience available than there is in other parts of the country.

There are many things to consider in building up sub-surface water mounds no m a t t e r what method of recharging is used. The Division asked for $450,000.00 for an experimental project near Manhattan Beach to determine what could be done with recharge wells and the n e c e s s a r y observation holes.

Due to the fact that the Los Angeles Flood Control District had started a similar project and the University of California was available with laboratories, the agencies interested pooled their facilities and undertook to determine some eight or nine basic factors entering into the problem.

The plans provided for the construction of nine 12-inch recharge wells and 36 observation holes. A pipe line was constructed to bring water from the Metropolitan Water District to be distributed to the recharge wells. At this time only part of the wells and observation holes have been completed. The

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TOM'S COLUMN

Dear Fellows:

Well boys, how is things around your way. Seems like this has been the easiest winter to live through that I've seen in these parts fer more years than I'd like to remember. Lookin' back over a stretch of years I only recollect one winter where we could slug it through all the way without pullin' stakes on account of weather. That was so long ago I can't even figger the year. 'Course there's no way of knowin' what'll come up to smack us yet this year, but so far it's been good goin'.

Sometimes you hear it said that this kind of a winter where they ain't much snow an' a dry fall season might do something or other to the ground water levels. Well, when you get to talkin' about ground water you sure can get yourself in a lotta arguments, an' for the most part a lot of us ain't too sure we know what we're talkin' about. When these here experts with a lotta initials back of their names writes hifalutin' articles about ground water the engineers and such folks may read 'em, but us ordinary guys most likely don't. Trouble is we ain't always sure the writer knows the score anyway. Some writers cook up scare stories about ground water figgerin' I suppose that they gotta be exciting or the magazine won't buy 'em. We can be pretty sure these kind ain't backed up by any responsible source.

The boy an' me was sittin' around fannin' the breeze with a couple old drillers we know an' the conversation got into this ground water argument. As you know, my boy has been goin' into the drillin' business pretty serious. He's keepin' fairly well posted on developments an' follows the geological surveys an' ground water level reports as well as other information that fits into the business. This old driller we was talkin' to, Big Ed, we call him, has been drillin' water wells for more'n thirty years. He don't have any truck with these here so called experts. He sez he ain't wastin' his time tryin' to read what they write, and even if he did he figgers they don't know nothing he ain't able to find out. Big Ed says any highbrow who does all his work at a mahogany desk don't know nothing practical. The guy gets his callouses on the wrong part of his anatomy. He says this here ground water is something we drillers can't change one way or the other. He claims he's been punchin' wells now fer a third of a century and by just usin' the sense the Lord gives him he's always been able to find water an' get it pumpin'. And he don't have to thank no highbrow scientific experts for any help, he says. Ed says he's always found enough ground water and if a time comes when he don't find it,

(Continued on Page 9)

(Continued from Page 8)

it just ain't there and nobody above ground can do anything about it.

The boy lips in then an' says that any driller who intends to stay in this business, the way things are shapin' up, should know something about ground water, 'specially in the area he's workin'. Big Ed says that's all hogwash. The boy tho stuck to his guns. He says Ed's off the beam when he figgers his well drillin' ain't had some help from science. Developments in modern equipment an' drillin' gear that Ed has to use sure wasn't something Big Ed dreamed up fer himself. He claims if a driller thinks his job is only punchin' well holes, an' not developin' a dependable water supply, then there's no argument. But all you got to do is to look around and see what's happenin' in the industry and the attention it's gettin' in state an' national gover'ment. He showed Ed some material from an article that was written by one of the big geologists of our time. He pointed out that the water supply industry is the biggest industry in the United States based on the weight of the product that's marketed annually. In this country 16,000 water systems supply some 94 million people with more'n 13,300,000,000 gallons every day. See how that stacks up with what we call big business. The yearly tonnage produced in steel—100,000,000 tons; oil — 340,000,000 tons; coal, 600,000,000 tons; farm products, 400,000,000 tons. But the water produced runs 21,000,000,000 tons in a year. The boy says drillers oughtta be pretty durn proud to be part of an industry that's bigger than all the others put together. He says we're dealin' in not only the most needed commodity in the life of people, but it's the cheapest. So it goes without sayin' that as the industry gets more an' more recognized for its importance — the need fer proper regulations an' laws concerning it are bound to increase. If you read at all you must know that many states are already settin' up ground water controls within their own borders. We ain't gonna be let alone to monkey with water reserves any more than the gover'ment lets people fool around with oil reserves. Take a look at the reports of some of these U. S. Geologic Service engineers an' you'll find out that depletions in ground water levels in some areas have gotta be dealt with. The troubles they're havin' in these parts where depletions are serious can't be laughed off. Most of it is blamed on the old theory that ground water is inexhaustible. Ed is wrong, he says, when he claims that nobody above ground can do anything about it. They are already doing things to recharge some of these here areas. Sure, there may be some crackpots that write scare stories once in a while. And it's pretty well understood by the real authorities that there's plenty of ground water in this country as a whole, but it's not evenly distributed. There are places where it's a real problem. In many of them places the trouble was that in the past there has been too much overdraft of the underground supplies, without any plan fer replenishin' it. Smart engineers tell us that most of these shortages could have been pegged by a little foresight—but our trouble is we don't make much effort to find out about such things. Big Ed just grunted an' ordered another round of beers. He says let them who want to fool around with theories—he'll go ahead an' get water his way. The boy says every driller or outfit that has anything to do with producin' a water supply should know the score wherever he's workin'. The dope is available—all you gotta do is ask fer it.

Like all argyments this one drifted away in another mug of beer because Big Ed, who is a fat, jolly old fellow happened to think of a funny story an' wanted to get it off his chest. It was purty good too, but I can't pass it on to you because I figger this is a family publication.

Things are lookin' up since the new administration took over—they tell us it ought to be good fer business. Let's all hope so, and good luck to you.

Yours truly,

TOM.

A mother was instructing her young son in table manners just before he was to leave for a party at the home of one of his little friends.

Mother: "Now, Junior, if you're offered a second piece of cake, be a little gentleman and refuse, just as nicely as your father does."

When the boy returned home after the party, his mother asked: "Did you refuse the second piece of cake, as I told you to?"

Junior: "Sure, mother, just like father does, I said: 'Take the damned stuff out of my sight.'"

—o—

Guard: "Sailor, are you going to kiss that girl?"

Sailor: "No, sir."

Guard: "Then, hold my flashlight."

—o—

"She's a nicely reared girl, isn't she?"

"I should say so. Not so bad from the front, either."

—o—

Chief of Police: "Can you give us a description of the missing teller?"

Bank President: "He's about six feet tall and $75,000 short."

—o—

Mabel: "Sorry, but I don't go out with perfect strangers."

Masher: "That's fine, Baby, cause I'm not perfect."

—o—

Jack: "Do you tell your wife everything?"

Jim: "No, what she does not know won't hurt me."

1st Young Man: "How is it you don't like girls?"

2nd Young man: "They are too biased."

1st Young Man: "Biased? What do you mean?"

2nd Young Man: "It's bias this and bias that, till I'm broke."

—o—

On getting a letter from her daughter, a student nurse, her mother was badly upset.

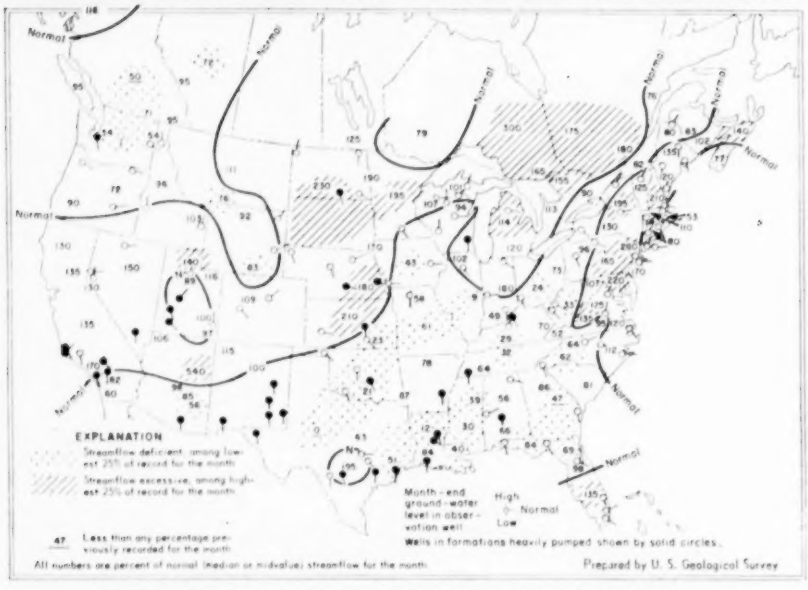
"I don't understand it," she moaned. "We send our daughter a good allowance, and yet she writes home that she has had to do a lot of panhandling this week."

—o—

Girl: "Am I the first girl you ever kissed?"

Sailor: "Now that you mention it, you do look familiar."

SURFACE and GROUND WATER CONDITIONS


Normal
EXPLANATION
Streamflow deficient, among lowest 25% of record for the month
Streamflow excessive, among highest 25% of record for the month
Month-end ground-water level in observation well
High
Normal
Low
Wells in formations heavily pumped shown by solid circles.
47 Less than any percentage previously recorded for the month
All numbers are percent of normal (median or midvalue) streamflow for the month
Prepared by U. S. Geological Survey

STREAMFLOW AND GROUND WATER IN RELATION TO NORMAL FOR THE MONTH, DECEMBER 1952

According to the Water Resources Review, runoff for November 1952 was far below normal for most of the United States and Canada. Slight increases in stream flow were reported the later part of the month from many areas, but the increases were not enough to do much more than halt the receding flows of early November. Below normal runoff in the Pacific Northwest caused some reduction in power generation.

Serious shortages of water were reported in the drought areas of Texas, Oklahoma, New Mexico, and southern Arizona. Ground water levels, except for parts of the Northwest and a small area along the central Atlantic Coast, were below average.

In December 1952 a near record low flow occurred in the Columbia River requiring large releases of stored water to provide near normal flow. In the same area irrigation storage is mostly above average. Runoff was below normal over much of southern United States. Ground water levels generally were average or above along the East Coast from Virginia north, over most of the Great Lakes area and the northern part of the Rocky Mountain region. Ground water levels generally were below average over most of the southern tier of states, the Ohio Valley, and parts of the Northwest.

In California ground water levels in most key wells in the southern part of the state were well below average. A record low level was measured in the heavily pumped area near Redlands. In New Mexico water levels in wells in the irrigated area were lower than they were in December 1951. The same was true in Nevada.

In the mid-continent region, record low water levels occurred in the west-central part of North Dakota. In western Nebraska they were near record lows, but near average in the eastern part. Water levels rose 6 feet during the fall in wells in San Antonio and Austin, but were still below average for these places. In Louisiana the water level in a well at Iowa Junction was the lowest on record for December. Water levels in other key wells declined and are below average.

In the Great Lakes region water levels were normal over most of the area, except in the southern peninsula of Michigan where the levels rose in the north-central part.

On Long Island in New York a reversal in downward trend was noticed, except the levels in deeper observation wells which continued to decline during the month.

MANHATTAN BEACH EXPERIMENT

(Continued from Page 7)

standard cable tool method is being used as it was felt this method of drilling would give more accurate logs, better formation samples, and be free of drilling mud.

The casings used are double stove-pipe casing in 4-foot lengths, which are perforated after being sunk to the desired depths. Geologists are on the job to obtain formation samples and check the drillers log. Water samples will also be taken. All of the drilling data and samples will be scientifically tested for geologic and hydraulic characteristics. Core samples will be preserved for examination and classification. Much valuable information has been secured already, but there is much more to be learned before this experiment is completed.

One of the principal questions not settled at the present time is the source of a cheap permanent water supply which will be required to create and maintain a permanent sub-surface mound or barrier to halt further salt water intrusion. The experiment is being followed closely by engineers, hydrologists and others interested in problems of this nature. If the experiment proves successful the plan will be used in other areas, though it is established now that work of this kind is costly and involves far more technical knowledge than is required to drill the wells and observation holes.

——o——

"Ole Luke looks well preserved, for a man of 55."

"He should — he's been pickled and canned often enough."

——o——

Little Louise: "Mother dear, what does dehydrate mean?"

Mother: "It means getting all the water out of anything. Why?"

Little Louise: "Well, my puppy just dehydrated in the living room."

——o——

He toils not, neither does he spin.

"What do you mean?"

"He lost his job and they repossessed his car."

THE LEGAL STATUS OF WATER

(Continued)

ILLINOIS

Permits for drilling wells are issued by Department of Mines and Minerals; logs of wells and, where desired, drill cuttings must be submitted to the State Geological Survey. Wells tapping oil- or gas-bearing rock shall, with certain exceptions, be cased so as to seal off all fresh water. Abandoned wells must be plugged so as to protect water suitable for domestic use or irrigation. In 1943 a bill was submitted providing for establishment of a Water Conservation Board having rather complete powers over the development and use of all waters in the State, except for water used for domestic or agricultural purposes, where the authority was limited to requiring the furnishing of information, and, for water used for agricultural purposes, to the prevention of excessive waste. The board would have had the authority to regulate withdrawal of water in designated "administrative water areas," in the interest of conservation, and to practice artificial recharge of ground water where reasonable regulation of withdrawal would not meet the need. The principle of priority was to be followed within the administrative areas, subject to existing vested rights; where the supply was inadequate even for existing rights the water would be apportioned among the users. However, in time of shortage the board would have had the authority to restrict withdrawals on bases other than priority, such as the public interest, relative benefits of use, etc., even in areas where rights based on priority had been acquired. The bill failed to pass. A somewhat similar bill was introduced in 1949 but was withdrawn by its sponsor upon agreement by prominent business and agricultural groups to collaborate in revising it and to support the revised bill.

Use of city water for air conditioning in Champaign-Urbana is restricted by rule of the water utility (see section in text on Restriction of use of water for air conditioning). The restriction was justified on the basis of depletion of the local ground-water supply, and the uneconomic, concentrated loads imposed by air conditioning on the wells and treatment and distribution facilities of the water company.

INDIANA

Riparian rights for surface water. Common law rights applied to ground water until 1947. A law passed in that year by the General Assembly prohibited the use of 200 gallons per minute or more of ground water for air conditioning and cooling purposes unless the water was recirculated through cooling towers or other devices and reused, or the water was returned to the ground through recharge wells, or a permit was obtained from the Department of Conservation. The Department was to deny such permits only when the available information indicated that a withdrawal in excess of 200 gallons per minute would affect the ground-water resources of the area "to such an extent that it will be injurious to the public health and welfare of the community." The State Board of Health issues permits for the return of water to the ground, requiring methods that will insure protection of the sanitary quality of the water.

The law provided no penalty for violation and no funds for enforcement. For these reasons, and also because the law restricted the use of water for a specific purpose and thus raised a question of constitutionality, it was not enforced strictly. It was repealed by the legislature in February 1951 and replaced by Senate Enrolled Act No. 56. The new law authorizes the Department of Conservation to declare "restricted-use areas" where withdrawal exceeds or threatens to exceed replenishment and to issue full or modified permits, or refuse to issue permits, for new uses exceeding 100,000 gallons per day. The Department is authorized to prohibit waste of ground water in restricted-use areas. Waste is defined to include any non-beneficial use (including permitting a flowing well to discharge more than 1,500 gallons per day of water that serves no useful purpose) and also the contamination of a fresh-water stratum.

Another law passed in 1947 (Chapter 277), and rules and regulations of the Indiana Department of Conservation promulgated thereunder, require a written permit for drilling any well for oil and gas or for secondary recovery, input wells, and wells for the disposal of salt water, brine, or oil-field wastes. It is further required that an accurate log or record of the well be filed with the Indiana Department of Conservation, showing the name, location, and elevation above sea level of the well; the name, character, and thickness of the formations encountered; the position and thickness of coal beds and other deposits of economic value; the kind of well (whether dry or productive, oil or gas) and, if productive, the initial production before and after shooting or acidizing; and the depth of any fresh-water horizon known to have been penetrated and such information as is available as to the volume of fresh water. Such records may be kept confidential upon request for a period of not less than 6 months.

The Conservation Commission also regulates the disposal of salt water and waste liquids, and gas and water input wells, to prevent surface or underground contamination.

(To Be Continued)

This is what Charles Warren's rig looked like the next morning after bringing in a gas and water well with the temperature below zero. Mr. Warren is located at Blenheim, Ontario.

ASSOCIATION NEWS

This section is devoted to the exclusive use of water well drillers' associations, both state and local. Notices, announcements, changes of officers and other items should be sent to The Editor, Johnson National Drillers' Journal, 2304 Long Ave., St. Paul, Minnesota.

INDIANA MEETING

The 22nd annual meeting of the Indiana Well Drilling Contractors Association will be held at the Conservation Building, State Fair Grounds, Indianapolis, Indiana, on Thursday and Friday, May 7 and 8, 1953.

A large meeting room with motion picture facilities, an inside exhibition room and plenty of outdoor space are available for exhibits and auto parking.

Suitable entertainment and a program of interest to all drillers is being worked out for this meeting. Mr. H. K. Carr, Greentown, Indiana, is Secretary of the Association. He will be glad to furnish details to those interested in attending the meeting.

MISSOURI MEETING

The Missouri Association will hold its 17th annual meeting at the Colonial Hotel in Springfield, Missouri April 13 and 14, 1953.

Space for displays of equipment and literature is ample and in keeping with the custom of past years; no charge will be made for display space. It will be "first come first served." Exhibits may be set up on Sunday, April 12.

The program as arranged provides for two technical sessions, the usual business meeting and annual banquet and entertainment on Monday evening, April 13. A large attendance is anticipated for this meeting. Mr. Dale L. Fuller, Service Secretary, P. O. Box 250, Rolla, Missouri, will be glad to supply additional information.

ILLINOIS MEETING

This association held its 26th annual meeting at the Kaskaskia Hotel in LaSalle, Illinois, Wednesday, Thursday, and Friday, January 28, 29, and 30. Wednesday afternoon and evening were devoted to registration and viewing exhibits. Technical sessions were held Thursday morning and afternoon. The annual banquet held on Thursday evening was followed by entertainment which was enjoyed by all.

After a technical session and business meeting Friday morning, the manufacturers served a free luncheon to all in attendance. This was considered one of the best meetings held by this association in recent years. Richard F. Fisher, Natural Resources Building, Urbana, Illinois, is Executive Secretary.

NEBRASKA MEETING

The 22nd annual convention and short course of the Nebraska Well Drillers Association will be held at the University of Nebraska on February 19 and 20. This meeting will feature talks and panel discussions of submersible pumps, the legal aspects and liabilities of well drilling, new developments in well drilling that may be applicable to water well drilling, individual well problems, etc.

A code of ethics tentatively adopted at the 1952 meeting will be discussed and presented to the drillers for approval. A summer picnic and demonstration of well drilling will be discussed at the business meeting.

The "Dutch Lunch" provided by the manufacturers and jobbers will be held Thursday evening, February 19, at the Lincoln Hotel. Write Mr. V. H. Dreeszen, Secretary, c o University of Nebraska, Lincoln, for details as to arrangements.

FLORIDA MEETING

The quarterly meeting originally set for January 3 was held January 10 at the Lamar Hotel in Orlando. Lunch was served at 1:00 p.m. after which several important matters were taken up and discussed by those present and the Board of Directors. Mr. Earl Van Every is Editor of the Association Bulletin and Field Representative; Mr. Clyde Freeman of Orlando is Secretary.

MICHIGAN MEETING

Plans are under way for the Silver Anniversary Convention of the Michigan Well Drillers Association to be held this Spring. According to Mr. Harold Armstrong, Secretary of the Association, the date and place of holding the meeting will be announced in the near future.

Dates were previously set for April 28, 29, and 30 with the meeting place at Grand Rapids, but these plans have been changed due to conditions beyond the control of the association. Mr. Armstrong, 484 Capital Avenue, S.W., Battle Creek, Michigan, is in charge of all arrangements and will announce the time and place of the meeting when available.

VIRGINIA MEETING

The Virginia Water Well Drillers Association at its meeting in Lynchburg, November 14 and 15, 1952, elected the following officers for 1953:

Frank Spangler, President, Christiansburg; H. L. Leazer, 1st Vice-Pres., Remington; N. B. Ragland, 2nd Vice-Pres., Wingina; C. R. Sundquist, Secy-Treas., Norfolk.

The new directors elected for three-year terms were:

D. C. Magette, W. J. Stevens, and Justus S. Auge. The next meeting will be held in Norfolk when it will be possible to do a little fishing as well as attend to drilling problems.

PENNSYLVANIA MEETING (Eastern Section)

A meeting of this group was held at the Penn-Harris Hotel in Harrisburg on January 23 and 24. In addition to the program and business meeting for drillers, there was held a banquet and luncheon, a cocktail party, a card party, and dancing party. Mr. Edward D. Potter and Frank Parente were co-chairmen in charge of arrangements for the meeting.

WISCONSIN MEETING

The 1953 convention meeting of Wisconsin Well Drillers, Inc. was held at Eau Claire, Wisconsin in the Hotel Eau Claire, February 5, 6, and 7, 1953. Special efforts were made to spend more time with the manufacturers. This opportunity to meet with the drillers was appreciated very much by the representatives present.

In addition, an interesting technical program was carried out for the benefit of the drillers. A report of the meeting and list of new officers will be published in following issues. Mr. Ralph H. Nienow, Merrill, is Secretary-Counsel of the association.

OHIO MEETING

The Ohio Well Drillers Association held a meeting January 24, 1953 at the new branch of McJunkin Corporation in Columbus, Ohio. After viewing the stock and facilities of the host company, the drillers were given an opportunity to tell what they thought should be in a stock of this kind.

This was followed by a business meeting, buffet luncheon and refreshments in the offices of the host. Reports are that it was an enjoyable meeting for everyone.

NEW YORK MEETING

The Empire State Association held its annual meeting in Oriskany, New York at the Trinkhaus Manor Inn, January 21, 1953. The program consisted of election of officers for 1953, adoption of revised by-laws, presentation of life membership plaque, banquet, and dancing in the evening. Several valuable door prizes given by the jobbers were drawn by the drillers holding banquet tickets. Clarence W. Crandall, Route 1, Pine City, is Secretary-Treasurer.

IOWA MEETING

The Iowa Association will hold its annual meeting at the Fort Des Moines Hotel in Des Moines, Wednesday and Thursday, February 25 and 26, 1953.

Arrangements have been made for exhibits on the second floor which must be in place when the convention opens at 9:00 a.m. February 25.

Suitable entertainment and an interesting program have been prepared for everyone attending this meeting. Travis C. Parker, West Branch, Secretary, has all the details.

MINNESOTA MEETING

The Minnesota Well Drillers Association will hold its annual meeting at the Nicollet Hotel in Minneapolis, March 26, 27, and 28, 1953.

A program of interest, including space for exhibits and entertainment, is being prepared by Mr. Norm Ovrum, 1495 West Larpenteur Avenue, St. Paul, Minnesota.

SOUTH DAKOTA MEETING

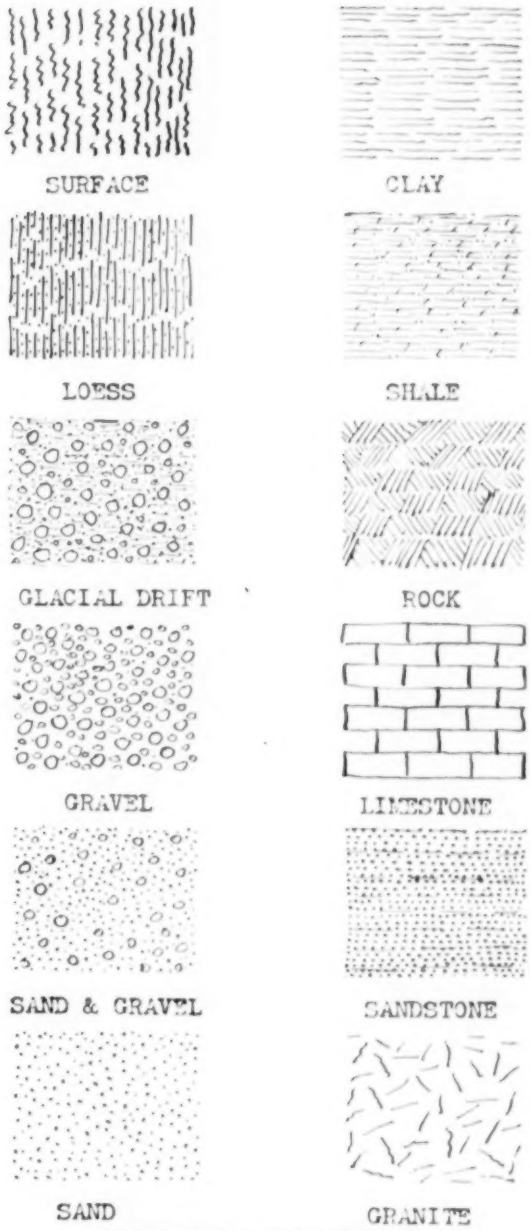
The annual meeting for 1953 will be held March 27 and 28 at the Marvin Hughitt Hotel in Huron, South Dakota. Details can be secured by contacting Mr. Harold P. Norbeck, Secretary, at Redfield, South Dakota.

—o—

Office Clerk (nervously): "Please, sir, I think you are wanted on the phone."

Employer: "You think. Don't you know?"

Office Clerk: "Well, sir, the voice at the other end said, 'Hello, is that you, you old idiot?' "



SUGGESTED IDENTIFICATION OF FORMATIONS IN WELL LOGS

EDITOR'S NOTE

With respect to our article on Ground Water Problems, which was published in the July-August 1952 issue of the Journal, we discussed matters which were included in the book "Conservation of Ground Water," by Harold E. Thomas, published in 1951 by McGraw Hill Book Co., New York. It is regretted that in that issue of the Journal we failed to give appropriate credit to Mr. Thomas and the McGraw Hill Book Co., Inc.

ADVERTISEMENTS

We will insert advertisements for drilling equipment wanted or for sale, help or work wanted, etc., for our readers, free of charge. Advertisements must be brief, and we cannot assume responsibility for them, but will be glad to put parties in touch with each other by this means and suggest that they investigate any offers or inquiries carefully for themselves.

FOR SALE: Approximately 4000 ft. 8" I. D. 28 lb. line pipe, used but in A-1 condition. Can be cut and threaded to specification by Landis pipe machines in our shop. Oil and water well supplies. Write: D. S. Dempsey & Son, Bolivar, New York.

FOR SALE: Super D Fort Worth Spudder, 3000 ft. capacity semi-trailer with 1947 Dia. T. tractor; rig has steel frame, 50' telescoping derrick, casing reel, cat-head, Wakesha power unit mounted on rig, tools to 20"; machine is completely portable and ready to run. Can be had with turbine test pump and 27' American house trailer if desired. Write: Don O'Connor, Spring Green, Wisconsin.

WANTED TO BUY: Used drilling rig to drill 3 to 5" holes, either jetting or cable, on trailer or truck. Write: Raymond H. Koch, Box 511, Hebron, North Dakota.

FOR SALE: Having completed test holes will sell Mobile dry hole auger, one year old and in new condition; 100 foot of 4" augers, two drill bits, one with 6⅜" throw-away cutting tips, the other has 4½" tips. Plenty of extra boring tips; all necessary tools. Cost $3063.00. Will accept best offer or cable tool machine in trade. Write: Elmer Crain, Boyne City, Michigan.

FOR SALE: One 1952 No. 42 Cyclone with telescope derrick, power derrick hoist, casing reel, spooling device, stem guide, starter, generator and battery; mounted on a 1940 2½ ton International truck with 5-speed transmission; good tires; with truck $4,500.00; without truck $4,250; drill is like new; no tools. Write: R. R. Long, R. R. 6, Jacksonville, Illinois, phone 512.

FOR SALE: Failing and Sullivan truck mounted rotaries, 1000' and 1500' capacity. Write: Fred E. Butler, Box 1832, Casper, Wyoming.

FOR SALE to highest bidder to close estate. 314C Failing Rotary Drill mounted on G.M.C. Truck with Gardner-Denver 4½x5 pump. 930 ft. drill pipe. 500 gal. water tank mounted on Ford 4 x 4 Truck. Core barrels, elevators, spiders, etc. All in good shape. For inventory contact Walker Bank & Trust Company, Salt Lake City, Utah.

JOB WANTED: Experienced driller in India, 26 years old, would like to come to United States to work for a drilling firm in order to get experience in American methods. Have been trained by the Indian Army and have been acting drilling foreman on rotary rigs in India. If you can use this man, please write: G. S. Punia, Drilling and Dynamite Engineer, Development Commissioner's Office, Indore (Madhya Bharat Government) India.

FOR SALE: Keystone No. 3½ mounted on 1944 Diamond T—2-ton truck; 450 feet of drill and sand line; all steel derrick with power lift, tool guide, and Bucyrus-Erie rubber shock absorber; drill and truck in good condition with all new rubber; drill powered by 1946 Mercury engine; priced reasonable. Write: Lampman's Well Drilling, Blue Mounds, Wisconsin, or phone M. T. Horeb, 91R9.

FOR SALE: Portable truck mounted Failing, Sullivan, Mayhew and Shop made drills; capacities 500 feet to 2,500 feet, complete tools, pipe, and etc. All types-cable tools. Write: Jim Williams, Williams Supply Company, Box 451, Enid, Oklahoma.

DRILLING EQUIPMENT WANTED: All types of drilling equipment and tools; buy, sell, or trade. Write: Jim Williams, Williams Supply Company, Box 451, Enid, Oklahoma.

WANTED: Bucyrus-Erie #20W or #22W used drilling machine or one comparable. Write full particulars, price, tools, etc. Write: Howard J. Hitchcock, 806 Pennsylvania Avenue, Elmira, New York.

FOR SALE: #16 Ideco trailer mounted; complete with catheads and casing reel, also #71 Speed Star; mounted on 1940 Ford truck; both of these rigs are A-1 throughout and ready to go to work. Write: T. W. Van Winkle & Son, Salem, Iowa.

WANTED: Driller and tool dresser, also man to operate well boring machine, plenty of work. Write: T. W. Van Winkle & Son, Salem, Iowa.

WANTED: Three drillers for one year in Turkey and Angola, capable teaching local drillers, $600.00 month and expenses. Write: World Mining Consultants, 220 Broadway, New York 38, N. Y.

FOR SALE: Failing 1500' capacity drill, also Sullivan and Franks 1000', all complete, tools, drill rod, etc. Write: Fred E. Butler, Box 1832, Casper, Wyoming.

FOR SALE: Two all steel drilling rigs, mounted on truck; pipe 2", 5", 6" galvanized 6⅝" black; two 10-foot 10-inch well screens No. 60 slot, also drilling tools. Write: Clarence Chadwick, Box 14, Deford, Michigan.

WANTED: 28-L fully equipped rig. State age, condition, and price; also complete casing reel for 22-W, 1950 Model. Write: Mr. A. Rankin, Hanley, Saskatchewan, Canada.

WANTED: A Bucyrus-Erie 24-L or similar type steel rig. Write: Fred Garrett, 2605 Avenue K, Lubbock, Texas, telephone 2-8458.

WANTED: Experienced drillers, cable tools; must be able to weld; have opening for two or three men; good pay and steady work. Write: William A. Crislip, 5434 Redwood Hiway North, Santa Rosa, California.

FOR SALE OR TRADE: 1000' rotary, 4½ x 5 pump, 3" Kelly, new King swivel, 450' 2⅞" drill pipe and miscellaneous tools bits, etc. Mounted on 1942 Ford truck with new motor; $3,500 or trade for 22-W or equal. Write: William A. Crislip, 5434 Redwood Hiway North, Santa Rosa, California.

FOR SALE: Armstrong Model 35W Band wheel type all steel drill, semi-trailer mounted; 36-ft. mast rubber shock absorber, all in good working order; extra shafts and gears; extra motor; ten tires alone on this outfit worth $400.00. Real bargain, $1,000 cash. Write: Stephen Kopyar, R.D. #4, Binghamton, New York, phone Binghamton 4-0747.

WANTED: Rotary drilling rig for test drilling 4½-inch hole to about 300 feet. Write: T. R. Hanks, Springfield Road, Decatur, Illinois.

TOOLS FOR SALE: Two 12", two 14", two 16", one 10" bits; three pairs of jars; one 12" Star perforator; one pair of 10" elevators; 10" & 12" drilling scows, 3 stems; 2¼"x3¼" O.W.S. & 2x3 A.P.I. joints; blower for Star, Keystone, & Bucyrus-Erie; one turbine test pump, 6-8" bowls; 150 ft. 5" column; belt head or electric drive; after March 1 will have 6" to 12" casing for sale; will buy drilling equipment. Write: Gerald E. Foster, 827 Broadway, Sonoma, Calif.

Spudding rig used by Tom Williams of Topeka, Kansas. Made by E. W. Meinard of Alta Vista, Kansas.

(Continued from Page 14)

WANTED TO BUY: Mayhew Model 1000 rotary drill 1946 or newer, must be in excellent condition, either with or without water truck, drill stem, bits and water well equipment. State cash price and condition of all equipment in first letter. Write: Western Drilling Company, Medicine Lake, Montana.

WANTED: Star 71 Spudder, Bucyrus-Erie No. 24L or 44 oilfield cyclone drilling machine with or without tools or some machine that will drill 2,000 ft. deep, mounted or dismounted. State price and condition. Write: Louis A. Bradfield, Box 25, LeRoy, Ohio.

FOR SALE: Lincoln 200 amp-welder with 2 cycl. Wisconsin air cooled engine; used 10 hours only; with 100 ft. of cable-holder, hood and box 1/8" rod. Complete cash $400.00; also #25 Armstrong drill rig on hard rubber for towing, no derrick, nor engine, counter shaft on back ready for engine mounting, will spool 2500 ft. of 3/4" line and sand line-Bucyrus drill line spooling device. Cash $400.00. Write: Gray Well Drilling Company, P. O. Box 181, Delafield, Wisconsin.

FOR SALE: One 16" practically new spiral bit with wing guide. Write or phone: Thein Well Company, Clara City, Minnesota.

FOR SALE: Complete well drilling equipment with drill pipe, etc. Mounted on new trailer with an all new LeRoi motor. Write: Mrs. Bertha Connor, Box 400, Artesian, South Dakota.

FOR SALE: No. 10 Ideco mounted on trailer, 33 ft. telescoping derrick with pipe braces and power derrick hoist machine equipped with blower, cathead, 500 ft. 5/8" line, 500 ft. 3/8" line. In first-class condition. Price complete $1,500.00. Write: Henry Schuster, Box 104, Golden, Illinois, or telephone 97.

FOR SALE: Gus Pech all-steel boring machine; 32' mast mounted on International truck, complete with rods, 6" to 24" augers; reasonably priced. Write: Milaeger Well Drilling Company, 4630 West Burleigh Street, Milwaukee, Wisconsin.

FOR SALE: Failing rotary drill on new International, 600' rod, new hoses, reconditioned 4 1/2x5 GD pump, automatic chucks, spider, new King swivel, and all necessary equipment. Other type of work forces sale of this drilling rig. Write or phone 3221, Dakota Drilling, Hettinger, North Dakota.

FOR SALE: Well drilling business; we will sell the entire business or sell equipment and drills separately; we have a new 42 Cyclone drill purchased in July of 1952 with casing reel, 2 cat heads, automatic feed, automatic spooling device, mounted on a 1948 two-ton Dodge truck, like new; also a 42 Cyclone drill, four years old, in very good shape mounted on 2-ton International truck; both drills to be sold with sand line, drill cable, and tools ready to operate; many other tools and casing to be sold. Write: Kabele Bros., Plattsville, Wisconsin.

WANTED TO BUY: All steel well boring machine that will dig 3 ft. holes or larger; machine must be in good condition; not over three or four years old. Write Daniel Bugbee, Box 10, Finley, North Dakota.

WANTED TO BUY: One well drill 24-W or 71 or 72 Speed Star; must be in good shape, truck mounted preferred and priced right. Write: Dee K. Linn, East Station, Box 308, Hooks, Texas.

FOR SALE: Bucyrus-Erie 22W drilling machine mounted on 1941 Ford truck; in good condition, ready to go. Price complete machine and truck $3500.00. Write: Hoeg and Ames, Lincoln, Iowa. Phone 23F4.

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Why do they put holes in swiss cheese, when it's limburger that needs the ventilation?

NEW GEAR DRIVE

Wherever electricity is not available for power, a new right angle gear drive has been developed for operating deep well turbines. It permits the use of gas, diesel, or gasoline engine power and is available up to 70 h.p. or more and is adaptable to any vertical pump.

The new driving unit should find wide favor in irrigation, water production in remote oil fields, public utilities, mining operations, state institutions and municipal installations.

It embodies several new features which make this drive a very efficient driving unit. Full details are contained in Bulletin No. 1775 by writing U. S. Electrical Motors, Inc., Box 2058, Los Angeles 54, California.

NEW SUBMERSIBLE PUMP

The Deming Company of Salem, Ohio has brought out a new submersible pump, with units designed for wells 4-inch or larger in diameter. Capacities range from 225 to 1500 gallons per hour with vertical distance to lowest water level in wells ranging from 40 to 400 feet.

All moving parts of pump and motor are water cooled and water lubricated, thus no running seals are required. Motor windings are permanently enclosed in a stainless steel case, with cable connected to a water tight fitting. Motor relay and capacitor are located in a control box above ground for easy accessibility.

Storage tank and control may be located at any distance away from well if desired with service line placed below ground to eliminate a pit or pump house. As pumping unit and motor are located down in the well, there is no danger of freezing, and tampering with the unit is eliminated.

Complete details can be obtained by writing for Bulletin No. 6700 from the Deming Company.

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Jimmy: "I love you terribly."
Elsie: "You certainly do."

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A PRESCRIPTION FOR MAKING WELL POINTS LAST LONGER

One of the worst enemies a well point (or a large well screen, for that matter) has is high velocity of water entering the screen. The faster water enters, the faster the screen will jam up with fine particles of sand or silt being carried along from further out in the formation. The faster water enters, the faster the screen openings will rust together or close up.

There is one, and ONLY one, way of reducing water velocity and thus prolonging the life of your well installation—INCREASE OPEN AREA IN THE SCREEN! This can be done in two ways: get a screen with the largest possible amount of open area per foot, and put in a longer screen than is absolutely necessary to transmit the desired amount of water.

Look again at the two squares at the top of the page. The small one represents the open area in a common well point; the large one represents the open area in a Johnson Red Head Drive Point. Now, imagine trying to force 10 gallons of water a minute through these openings. Which of them will let the water through with a slower velocity?

Of course, the water entering the large opening will have a slower rate of flow and will not carry along the fine silt that a faster flow will.

Although we hope that you will try Johnson Red Head Drive Points if you aren't already using them, this prescription will hold true for any well point or screen, regardless of make:

1. USE A SCREEN WITH THE LARGEST POSSIBLE AMOUNT OF OPEN AREA PER FOOT.
2. PUT AN EXTRA FOOT OR TWO OF SCREEN IN YOUR WELL INSTALLATION. The small additional cost will be more than made up by the length of time it will last, and the increase in customer satisfaction.

EDWARD E. JOHNSON, INC.

— well screen specialists since 1904 —

ST. PAUL 14, MINN.